National Aeronautics and Space Administration

Endotronix Licenses Two NASA Patents to Develop More Accurate, Less Invasive Ways to Measure Cardiovascular Conditions in the Human Body

In July 2008, Endotronix, Inc. licensed two patents from NASA's Glenn Research Center for radio frequency (RF) Bio-MEMs sensor technology that can eventually help thousands of people avoid the potentially life-threatening complications of hypertension, abdominal aortic aneurysms, and congestive heart failure. The Endotronix RF Bio-MEMs sensors can be implanted in the body, then wirelessly transmit findings to a hand-held or wearable device that transmits the data to a remote data center. This medical device will enhance health care professionals' ability to monitor patients faster and in a less intrusive way than previously possible. The technology originated from Glenn's research into extremely small antennas for microelectromechanical systems. Endotronix is collaborating with Glenn researchers under a reimbursable Space Act Agreement (SAA) to continue its development work.

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Benefits of Technology Transfer

- An Endotronix RF Bio-MEMs sensor can be implanted in the body and wirelessly transmit data to a hand-held device that will also power the implanted sensor. The data will be telemetrically transmitted to a data center for further assessment and analysis.
- The technology could dramatically improve monitoring of patients suffering from cardiovascular conditions.
- NASA's small initial investment in the technology will be offset by a reimbursable SAA with Endotronix that will enable Glenn researchers and Endotronix to keep developing the technology, and eventually earn royalties from the resultant commercial product.
- NASA will have a fully developed and tested commercial product that it can use to remotely monitor astronaut health on long space missions, and possibly for in-situ monitoring of planetary soil and atmospheric constituents, and for aircraft engine performance monitoring.

success

On the Record

"We provided a small amount of funding in 2002, to demonstrate the application of NASA technology to biomedical problems. It is exciting to see the first of these efforts being licensed." — *Kathleen Needham, Chief, Technology Transfer and Partnership Office, NASA's Glenn Research Center*

"We were impressed by the large transmission distance but very small sensor size of this technology because the biggest challenge with these kinds of sensors is to get the signal out of the body using a small sensor that doesn't damage surrounding tissue." — *Dr. Harry Rowland, Vice President of Engineering, Endotronix*

About Endotronix

Founded in Peoria, Illinois in 2007, Endotronix, Inc. is a medical device company dedicated to the development of minimally invasive wireless health monitoring products and related data services. The company's initial focus is on a monitoring tool to address cardiovascular disease, primarily hypertension and congestive heart failure. Such a device will improve healthcare by enhancing treatment and reducing the overall cost of hospital care. Endotronix's co-founders, Anthony Nunez, M.D. and Dr. Harry Rowland, bring medical and engineering expertise to the company's endeavors. Endotronix currently has offices in Peoria, Illinois and Cleveland, Ohio.

About the Technology

In 2002, the Commercial Technology Office established a priority for demonstration programs that applied NASA technology to solving biomedical problems. Two Glenn researchers, Dr. Felix Miranda and Dr. Rainee Simons, were awarded $50,000 from the CTO Fund that same year to adopt GRC Radiofrequency (RF) technology, originally part of the communications program, to the development of novel miniature conformal antennas and signal processing circuits that could be used in Bio-MEMs sensors and actuators. Their goal was to create highly accurate sensors, implantable with minimal power dissipation into surrounding tissue and no wires protruding through the skin.

The technology starts with a wireless RF telemetry system, consisting of a Bio-MEMs implantable sensor and an external hand-held unit. A MEMS capacitive pressure sensor, integrated with a miniature inductor/antenna, make up the implantable sensor. Signal processing circuits, collocated with a printed loop antenna, form the hand-held unit that is capable of inductively powering and also receiving telemetry signals from the sensor. The implanted sensor is 1 millimeter long by 1 millimeter wide and a half-millimeter thick. The hand-held unit is the size of a small cell phone.

Rowland pointed out the primary benefits of wireless sensors—they can be used continually (as opposed to blood pressure cuffs), and a sensor will be of particular help when a patient has been transferred from the ICU to a step-down unit. Physicians can chart the effects that oral medication is having on blood pressure control, for instance, and better customize treatment.

The Transfer Process

In 2006, cardiothoracic surgeon Nunez learned about the patents that Miranda and Simons had filed and became intrigued. "He had become aware of sensor technology in his practice and wanted to know how to use it, so he started to investigate," Rowland said. Nunez formed a company, and signed a reimbursable SAA with Glenn in 2007, enabling him access to Miranda's and Simons' expertise to do validation research on the technology. The success of that research led to the licensing agreement with Endotronix, signed in July 2008.

Gearing Up for Commercialization

Endotronix has expanded its operations from Peoria, Illinois to Cleveland, Ohio, with the assistance of BioEnterprise and TechLift. It also has received a grant from the Lorain County Community College Foundation Innovation Fund. Nunez has joined the Cleveland Clinic Foundation as a clinical associate. Endotronix plans to implant and study the sensors in animals in 2009, and to begin clinical testing with humans in 2010.

For More Information

If you would like additional information about Glenn's technology transfer opportunities, please contact:

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